concentrically disposed blunting component and needle component can then be removed from the guide member(s) and secured to a syringe or other device in a conventional manner. The guide member(s) can then be re-used to facilitate the assembly of another device.

As described with reference to FIG. 9A, the mounting end of the blunting member was inserted into the insertion tip of the needle cannula. However, in an alternative embodiment of the invention, a guide member configured to provide a guide surface that leads axially to hub aperture **40c** could be disposed at the opposite end of the needle component so that the tip of blunting member **14** is aligned with, and is inserted into, the mounting end **18***b* of needle cannula **18** through hub **20** via aperture **40***c*. In such case, the blunting member hub may optionally be mounted on the blunting member before the blunting member is inserted into the needle cannula.

It will be understood that the V-shaped configuration of grooves **58** and **60** are illustrative only and any suitable groove geometry which functions to align the needle cannula **18** and blunting member **14** for assembly thereof may also be employed in the practice of this aspect of the invention. For example, the apex of guide surface **58** need not be angular in cross section as illustrated, but could be curvilinear in cross section. It will also be understood that the concentric relation between the blunting member and the needle cannula may be reversed (not shown), as discussed above in connection with FIGS. **5** and **6**.

In an alternative embodiment, a guide member may be configured to define two guide surfaces comprising grooves of differing configurations. For example, a guide member **52'**, FIG. **9B**, resembling the end-to-end joinder of guide members **50** and **52** could be formed and would thus define a guide surface that comprises two grooves **58** and **60** on the same structure. The resulting guide member **52'** would thus permit the positioning of the needle cannula in guide surface **58** and the positioning of a blunting member in the groove **60** to facilitate insertion of the blunting member into the needle by moving the blunting member into the needle cannula, as suggested by arrow **56'**.

Referring now to FIG. **10**, in this embodiment a vertical assembly process is contemplated wherein the guide member comprises a funnel **62** which may, e.g., reciprocate in the direction of arrow **64** as described hereafter. As illustrated, the internal component, i.e., needle cannula **18**, funnel **62**, and external hub **20** are disposed in spaced relationship along a vertical axis B. The funnel is employed to facilitate insertion of an internal component, in this case needle cannula **18**, into an external component, in this case hub **20**, having a passage **38** which provides a through-bore therein. Funnel **62** defines an entry aperture **62***a* and an exit aperture **62***b*. The internal diameter of exit aperture **62***b* is not larger than the entrance of passage **38** into which the internal component is to be inserted, and the entry aperture **62***a* is larger than the exit aperture. Funnel **62** comprises an internal guide surface **62***c* that converges axially from the entry aperture **62***a* to the exit aperture **62***b*. In operation, funnel **62** is positioned with exit aperture **62***b* aligned with passage **38**. The mounting end **18***b* of the internal component is aligned with entry aperture **62***a* and is advanced into the funnel. This may be achieved in a vertical assembly process by positioning the funnel vertically over the external component, positioning the internal component above the entry aperture of the funnel, and releasing the internal component so that it is pulled by gravity into the funnel. The needle will come to rest on internal shoulder **39**. A second funnel having an exit aperture not larger than the through-bore of the needle may be used in a similar manner to facilitate the insertion of the blunting member into the needle. The blunting member will be configured to pass through the needle and through the hub so that the blunting member hub or "nut" can be secured to the bottom end of the blunting member.

Alternatively, the needle component, i.e., the hub **20** with the needle **18** secured therein, may be inverted and the blunting member may be introduced into the mounting end of the needle through-bore. In such case, the guide member may be embodied as a split fixture having separable halves that are movable between a working configuration illustrated schematically in FIG. **11A** and a separated configuration illustrated schematically in FIG. **11B**. In the working configuration, an assembly fixture holds parts **162***a* and **162***b* together so that they cooperate to form a generally conical, funnel-like guide surface **162***c*, as shown in FIG. **11A**. The fixture **162** is positioned so that the exit aperture of the guide surface (not visible in FIG. **11A**) is aligned with the mounting end of a needle cannula. The tip of a blunting member **14** is then aligned with the guide surface **162***c*, e.g., by directing it downward from above, and is brought in contact therewith and is advanced therethrough so that it is guided to the exit aperture and then into the needle cannula. The nut on the blunting member (shown in dotted outline in FIG. **11B**) is larger than the exit aperture of the guide surface **162***c* and cannot pass therethrough, so after the blunting member has entered the needle cannula, parts **162***a* and **162***b* are separated as suggested by the unnumbered arrows in FIG. **11A**. The fixture **162** thus attains the separated configuration of FIG. **11B**. The self-blunting needle device may thus be assembled and removed from the fixture **162**. The fixture **162** can then be moved back to the working configuration of FIG. **11A** and positioned for use in inserting another blunting member into another needle cannula.

In the embodiments of FIGS. **9A**, **9B** and **10**, the guide member is not an integral part of the finished self-blunting needle device, so the method for the assembly of the needle device may comprise removing the assembled device from the guide member.

In the embodiments of FIGS. **1–4**, the needle cannula **18** in the hub **20** may be considered the reference member because its position is fixed relative to the first guide surface (e.g., surface **40**, FIG. **2A**) which guides the misaligned complementary member, i.e., the blunting member **14**, into the cannula through-bore.

In the embodiments of FIGS. **5** and **6**, the blunting member **14'** is the reference member because it is fixed in position relative to the guide surface **40'** and the needle cannula **18'** constitutes the complementary member.

While several preferred embodiments have been shown and described, various modifications and substitutions may be made thereto without departing from the spirit and scope of the invention. Accordingly, it is to be understood that the present invention has been described by way of illustration and not limitation.

What is claimed is:

1. A self-blunting needle cannula device comprising:

(a) an external component comprising a needle cannula having a through-bore, a tip comprising a puncture tip, a mounting end, and an external component hub on the needle cannula spaced from the tip;

(b) an internal component comprising an elongate blunting member having a tip defining a blunt tip, and an internal component hub on the blunting member being disposed within the through-bore of the needle cannula;

(c) wherein the external component and the internal component are movable relative to each other between

a sharpened configuration in which the blunt tip is positioned short of the puncture tip of the needle cannula to leave the puncture tip exposed, and a blunting configuration in which the blunt tip extends beyond the puncture tip of the needle cannula to effectively blunt the device;

(d) a guide surface on the device that leads axially towards the through-bore so that the guide surface can serve as a guide for the insertion of the blunting member into the through-bore during assembly of the device; and

a detent and groove engagement between the external component and the internal component configured to inhibit movement from the blunting configuration to the sharpened configuration.

2. The device of claim **1** wherein the guide surface converges axially from a first entry aperture larger than the through-bore to a first gate aperture not larger than the through-bore, the first gate aperture being aligned with the through-bore.

3. The device of claim **1** wherein the guide surface comprises a non-convergent surface that defines a groove that is positioned and configured to guide the blunting member into the through-bore of the needle cannula.

4. The device of claim **3** wherein the guide surface further comprises a portion that converges axially from a first entry aperture larger than the through-bore to a first gate aperture not larger than the through-bore, the first gate aperture being aligned with the through-bore.

5. The device of claim **3** or claim **4** wherein the first entry aperture has a diameter in the range of from about 0.5 to 0.009 inch and the first gate aperture has a diameter in the range of from about 0.203 to 0.006 inch.

6. The device of claim **2** wherein the needle cannula defines a longitudinal axis and wherein at least a portion of the guide surface defines an angle α relative to the needle cannula axis and wherein the angle has a magnitude in the range of from about 5 to 75 degrees.

7. The device of claim **2** or claim **3** comprising a guide member disposed at the mounting end of the needle cannula, the guide member defining the guide surface.

8. The device of claim **7** wherein the guide member is disposed within the external component hub.

9. The device of claim **7** wherein the guide member is integrally formed as part of the external component hub.

10. The device of claim **9** wherein the guide member comprises an alignment lug formed on the external component hub.

11. The device of claim **3** comprising a guide member having a first end at which the first guide surface is formed and an opposite, second end at which is formed a second entry aperture larger than the needle cannula and a second guide surface that converges axially to a second gate aperture smaller than the second entry aperture but not smaller than the needle cannula, the guide member further comprising a passage extending between and axially aligned with the first and second gate apertures, the needle cannula extending through the second gate aperture and the mounting end of the needle cannula being mounted within the passage, and wherein the second guide surface converges from the second entry aperture towards the bore to the second gate aperture, to serve as a guide for the insertion of the mounting end of the needle cannula into the passage during assembly of the device.

12. The device of claim **11** wherein the first gate aperture is smaller than the passage in the guide member and smaller than the needle cannula so that the guide member defines in the passage a stop shoulder at the first gate aperture.

13. The device of claim **11** wherein the second entry aperture has a diameter in the range of from about 0.5 to 0.009 inch and the second gate aperture has a diameter in the range of from about 0.203 to 0.006 inch.

14. The device of claim **11** wherein the second guide surface defines an angle α relative to the needle cannula axis and wherein the angle has a magnitude in the range of from about 5 to 75 degrees.

15. The device of any one of claims **1–4** in combination with a syringe comprising an actuation member for moving the device from a sharpened configuration to a blunted configuration.

16. The device of claim **1** wherein the detent and groove engagement is dimensioned and configured to releasably maintain the device in the sharpened configuration prior to its movement to the blunted configuration.

17. A method for assembling a self-blunting needle device for a syringe, the device comprising an internal component comprising a blunting member and an external component comprising a needle cannula having an axially-extending through-bore therein, the method comprising advancing the blunting member into contact with a guide surface configured to lead axially to the through-bore to guide the blunting member into the bore and advancing the blunting member along said guide surface and into the through-bore without engaging a catch surface perpendicular to the needle cannula, to produce an assembled device.

18. The method of claim **17** comprising advancing the internal component into contact with a non-convergent guide surface.

19. The method of claim **17** comprising advancing the internal component into contact with an axially convergent guide surface.

20. The method of claim **19** wherein the guide surface defines an entry aperture that is larger than the through-bore of the external component and converges to a gate aperture that is not larger than the through-bore of the external component, the gate aperture facing and being aligned with the through-bore, the method comprising aligning the internal component with the entry aperture and advancing the internal component towards the external component so that the internal component passes through the entry aperture, into contact with the guide surface and then through the aperture and into the bore.

21. The method of claim **17**, claim **18** or claim **19** comprising contacting the external component with a first guide surface and contacting the internal component with a second guide surface.

22. The method of claims **17, 18, 19** or **20** wherein the guide surface is provided by a non-integral guide member and wherein the method comprises removing the assembled device from the guide member.

23. The method of claim **22** wherein the external component comprises a cannula having a tip and a mounting end mounted in a hub, the hub defining an aperture that permits access to the through-bore by the internal component, wherein the guide member comprises a funnel having a gate aperture and an exit aperture and wherein the method comprises aligning the gate aperture of the funnel with the through-bore at the tip of the cannula, passing the internal component through the guide member and removing the assembled device from the guide member.

24. The method of claim **23** further comprising securing a nut to the internal component after the internal component passes through the guide member.

25. The method of claim **17** further comprising mounting the self-blunting needle device on a syringe.

26. A method for assembling a self-blunting needle device comprised of (i) an external component comprising a needle cannula having a through-bore, a puncture tip and a mounting end and a guide member having a first end and a second end and a passage that extends axially from the first end to the second end and further comprising at the first end a first guide surface that leads axially to the passage and at the second end a second guide surface that leads axially to the passage, wherein the passage is sized to receive the needle cannula; and (ii) an internal component comprising an elongate blunting member having a blunt tip, and, after assembly, being disposed within the through-bore of the needle cannula;

the method comprising the steps of:

(a) disposing the needle cannula with its mounting end disposed towards and in alignment with the second guide surface and advancing the needle cannula into contact with the second guide surface and into the passage and into alignment with the first gate aperture,

(b) positioning a guide member having a guide surface relative to the external component so that the guide surface leads axially to the through-bore; and

(c) advancing the blunting member into contact with the guide surface to guide the blunting member into the through-bore of the needle cannula.

27. The method of claim 26 comprising providing a guide member having a first end and a second end and a passage that extends axially from the first end to the second end and further comprising at the first end a first guide surface that leads axially to a first gate aperture aligned with the passage and at the second end a second guide surface that leads axially to the passage, wherein the passage is sized to receive the needle cannula,

the method further comprising, before steps (a) and (b), disposing the needle cannula with its mounting end disposed towards and in alignment with the second guide surface and advancing the needle cannula into contact with the second guide surface and into the passage and into alignment with the first gate aperture.

28. The method of claim 26 further comprising the steps of installing the self-blunting needle device in a medical fluid-handling device comprising an actuation member for moving the device between the sharpened configuration and the blunted configuration.

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